Bi-Weekly Teleconference Summary

The first HFIP–Biweekly teleconference in September 2017 was held 2:00 PM – 3:00 PM ET Wednesday September 6th *online* from the NWS Headquarters OSTI, Silver Spring, MD. Following roll call (see back for list of participants), Shane Forsythe-Newell (HFIP/PO) welcomed about 22 members onboard (many members were busy with this active hurricane season), and along with Gopalakrishnan Sundararaman (HRD/HWRF) shared opening remarks noting the purpose of the meeting.

Introduction and Announcements:

The first part of this meeting consisted of announcements from the HFIP Program Office for all RT DEMO Project PI's and POCs that they should open a help ticket if they are having an issue they are unable to resolve by emailing "rdhpcs.jet.help@noaa.gov" and use the preface "HFIP RT - " plus title for issue, in the subject line as this ensures the issue will be tracked through the help system.

Presentation by Zhuo Wang on:

Tropical cyclogenesis[1] was shown via Go-To-Meeting, and also made available to all participants via HFIP's anonymous FTP temporary link for those who might have had a problem using Go-To-Meeting.

The speaker (Associate Professor, Univ. of IL, Urbana-Champaign), initially thanked her peers, contributors, supporters, and presented three initial motivating questions relating to the genesis of tropical cyclones (TCs). The first question was "What are the key features of convection leading up to genesis?" Interesting features noted were "*pouch tracks*" in terms of data sets for 164 named storms in the Atlantic-basin (1989-2010), Wang and Hanks (2014). Supportive data noted supporting the 2nd question, "What thermodynamic conditions promote the development of pouches?" was presented, e.g., rain rate, reflectivity, column water vapor from SSMI/SSMIS, GribSat-B1 Infrared (Knapp, et al 2011), and 6-h data from ERA-Interim reanalysis. The 3rd question was "What are the roles of different types of precipitation in TC-genesis?" In response to this question, cumuliform (convective) and stratiform precipitation types were presented by the speaker (Fig. 1) with stratiform (S) accounting for most of the precipitation. Stratocumulus (SC), Mid-Level (ML), and Deep Convection (DC) were other types associated with precipitation. DC was noted to be a prominent initial trigger for low-level vortex development and stratiform clouds with precipitation were identified as being associated with mid-level vortex development. Stratiform precipitation was noted as contributing to moisture preconditioning before transitioning to *sustained deep convection*. Equivalent potential temperature (^{o}e) profiles were depicted for TCs' *Karl* and *Matthew* that showed significant increases near the pouch 2-days prior to genesis, which might signify impending TC genesis. This may be a key feature leading up to TC-genesis. It was also noted that stratiform heating contributes to the mid-level spin up without significantly spinning down the low-level circulation.

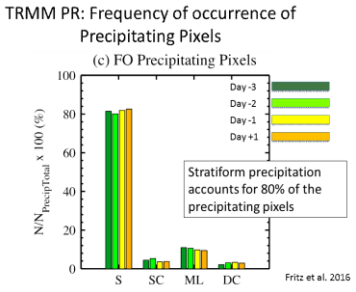

Figure 1. Precipitation Occurrence

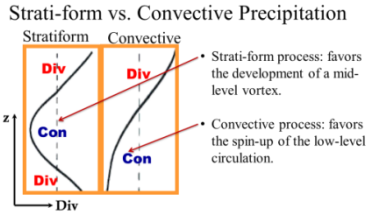

Figure 2. Mid-level and Low-level vortex development.

Three different type of spatial patterns were presented by infrared (10˚x10˚ grid), relative flow (700 mb), relative humidity (600 mb, see Fig. 3), relative vorticity (700 mb), and vertical X-sections (1000-200 mb)

[1] Wang, Z. (2017). *Exploring the key features of tropical cyclogenesis using satellite data*. Presentation was by Dr. Wang, Associate Professor, Dept. of Atmospheric Sciences, University of Illinois at Urbana-Champaign. Presentation at the Hurricane Forecast Improvement Project HFIP-Biweekly Teleconference, 06 September 2017, National Weather Service HQ, Silver Spring, MD.

with relative humidity. Relative flow in cluster 1 showed strong westerlies in the upper troposphere (trop) and cluster 3 showed weak easterly trop flow with a strong westerly flow in the planetary boundary layer. Relative vorticity (700 mb) in cluster 1 showed a slightly elongated vortex ellipse with greater intensity along the positive portion of the x-axis. Cluster 2 vorticity was nearly circular in appearance while cluster 3 was flattened out on the y-axis and elongated along the x-axis but with equal intensity in all vortex quadrants. Convective cores in cluster 1 depicted a slight tilting of the convective core with increasing height, and cluster 2 depicted a balanced slightly smaller convective core. Cluster 3 depicted a larger convective core that was not tilted. Relative humidity (RH) at 600 mb showed the pouch displaced south of the vorticity center along the ITCZ in cluster 1. RH in cluster 2 was significantly weaker but more centrally located with the vortex center. Cluster 3 depicted significantly stronger RH than clusters 1 and 2 that was equally distributed along the x-axis in the ITCZ.

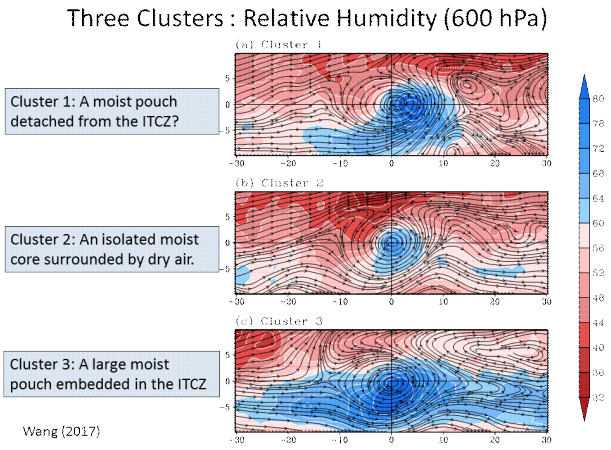

Figure 3. 600 MB Pouches in the Inter-Tropical Convergence Zone (ITCZ) associated with 3 different spatial patterns.

Summary:

The Key feature of convection for TC genesis was the convective organization near the pouch center vs. intensity or extent of deep convection. Column moistening near the pouch center precedes transition to sustained deep convection and tropical cyclogenesis. Tropical cyclogenesis may be an outcome of collective contribution by stratiform and cumuliform (convective) precipitation.

Closing Remarks:

It was noted by Gopal Sundararaman the presentation was very good with good participation and interaction. Shane Forsythe-Newell followed up by announcing the next meeting date time, thanked everyone, and adjourned the meeting.

Announcements:

- The next HFIP Annual Meeting date and information will be forthcoming at our next meeting.
- The AMS will hold their 97th Annual Meeting in Seattle January 22-26, 2018.

Next Meeting time: 2-3 PM ET Wednesday, 20 September 2017

- Shane to send out a reminder. Following roll-call and any announcements from the HFIP Program Office, a round table discussion with Team Leads is planned with project updates from Gus Alaka (AOML), Morris Bender/Andy Hazelton (GFDL) and others.

Participants (22):

Avichal Mehra (NCWCP), Bin Liu (EMC), Bryce Tyner (FIU), Chanh Kieu (Indiana Univ.), Edward Mifflin (HFIP/PO), Evan Kalina (GSD), Frank Marks (AOML), Gopal Sundararaman (AOML/HRD), Jili Dong (EMC), Kate Musgrave (CO State Univ.), Kathryn Newman (DTC), Mark Boothe (NPS), Nysheema Lett (HFIP/PO), Ping Zhu (FIU), Ryan Torn (SUNY), Shane Forsythe-Newell (HFIP/PO), Sue Chen, Tim Marchok (GFDL), Xu Lu, Xuejin Zhang (Univ. of Miami), Zhan Zhang (NCEP), and Zhuo Wang (Univ. of IL).